

REMARKS

Overview of the Office Action

Claims 1-4, 12, 16, and 33 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 6,291,839 (“Lester”).

Claims 1, 14-15, 18-19, 30-31, and 34-35 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 6,410,942 (“Thibeault”).

Claims 18-20 and 37 have been rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 5,792,698 (“Nishitani”).

Claims 5-11 and 13 have been rejected under 35 U.S.C. 103(a) as unpatentable over Lester.

Claim 17 has been rejected under 35 U.S.C. 103(a) as unpatentable over Lester in view of U.S. Patent No. 6,515,310 (“Yamazaki”).

Claims 20-29 and 36 have been rejected under 35 U.S.C. 103(a) as unpatentable over Thibeault.

Claim 32 has been rejected under 35 U.S.C. 103(a) as unpatentable over Thibeault in view of Yamazaki.

Status of the claims

Claims 1-37 have been amended.

Claims 1-37 remain pending.

Rejection of claims 1-4, 12, 16, and 33 under 35 U.S.C. §102(b)

The Office Action states that Lester teaches all of Applicants' recited elements.

Independent claim 1 has been amended to recite, inter alia, a radiation-emitting semiconductor device that includes a multilayer structure "wherein... the semiconductor device is free of a deposition substrate of the multilayer structure", which Lester fails to teach or suggest. Support for the above claim amendment can be found in paragraphs [0042] and [0047] of Applicants' published specification.

According to the "Dictionary of Engineering and Technology" (see page 352, a copy of which is attached hereto), "device" is translated in German to "bauelement", which is the term used in the corresponding PCT Application (WO 2004/017430 A1 p.3, last paragraph).

As amended, Applicants' invention is now clearly directed to a complete and whole semiconductor device, and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Lester discloses a GaN-based LED that includes a hetero-junction device 10, having an emission layer 14 interposing an n-type layer 12 and a p-type layer 16, fabricated on a substrate 8 (i.e., deposition substrate). A reflector 9 is positioned on the backside of the substrate. An n-contact 18 is electrically connected to the n-type layer 12 while the p-contact 20 is electrically connected to the p-type layer 16. Both electrical contacts are preferably made from reflective metals (i.e., metals that reflect greater than 70% of normally incident visible light). A p-bond pad 21 is positioned on the p-contact (see col. 2, lines 57-67 and Fig. 1 of Lester).

The Examiner cites Fig. 5 of Lester as teaching Applicants' recited invention. Applicants disagree. As described above, and also as clearly shown in Fig. 5 of Lester, the multilayer device of Lester includes a substrate 8.

According to Lester "[t]he top surface of the LED has been roughened, preferably in alignment with the openings in the contact. This may be achieved by etching the GaN in a self-aligned fashion during the same lithographic step used to pattern the contact. The etched holes can extend into the p-layer 16 or can be etched as deep as the substrate" (see Fig. 5, and col. 5, lines 8-14 of Lester). There is no teaching or suggestion in Lester that the substrate 8 could be omitted, or that it is removed.

Clearly, the light-emitting device disclosed by Lester does, in fact, include the substrate 8 (i.e., deposition substrate), and thus fails to teach or suggest Applicants' recited semiconductor device, which "is free of a deposition substrate".

Further, even if one skilled in the art were to remove the substrate from the device of Lester, the resulting device would not include a reflector as the Examiner asserts. The reflector 9 of Lester is disposed on the opposite side of the substrate. If the substrate is omitted or removed, then the reflector 9 must also necessarily be omitted or removed.

In contrast to Lester, and as clearly shown in Applicants' Fig. 1, Applicants' multilayer structure 12 is free of a deposition substrate. Therefore, Lester clearly fails to teach or suggest a radiation-emitting semiconductor device that includes a multilayer structure "wherein... the semiconductor device is free of a deposition substrate of the multilayer structure", as recited in Applicants' amended claim 1.

In response to Applicants' previous arguments, the Examiner continues to assert that the term "semiconductor component" is merely a label and a broad limitation. The Examiner further

continues to assert that the n type layer 12, the emission layer 14, and the p type layer 16 of Lester together can form Applicants' previously recited semiconductor component without the substrate 8, and thus the multilayer structure of Lester is free of a deposition substrate.

As described above, Applicants' claims have been amended to now recite a semiconductor device, which is clearly a complete and whole semiconductor device, and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Therefore, in view of the amendments to Applicants' claims, the Examiner cannot select an arbitrary sub-sequence of single layers of the device of Lester as reading on Applicants' claims. Further, the Examiner cannot hand pick particular ones of the multiple layers of the device of Lester, assemble those selected particular layers in an order contrary to the teachings of Lester, and then assert that such an artificial assembly anticipates Applicants' recited invention. The Examiner must consider the entire device disclosed by Lester. Such a consideration fails to teach or suggest Applicants' recited device, which "is free of a deposition substrate".

Additionally, the Examiner points out that Applicants' figures appear to show a substrate 30. Applicants fail to see the significance of the Examiner's point. Applicants' invention is defined by that which is recited in the claims, and not by specific embodiments that are disclosed in the specification. Further, the substrate 30 shown in Applicants' figures is a carrier substrate, to which the Applicants' recited semiconductor device is affixed. Applicants' claims recite that the semiconductor device "is free of a deposition substrate". It is well known in the art that a carrier substrate is not the same as a deposition substrate (which is explicitly disclosed by Lester and the other cited references discussed below).

In view of the foregoing, Applicants submit that Lester fails to teach or suggest the subject matter recited in independent claim 1. Accordingly, claim 1 is patentable over Lester

under 35 U.S.C. §102(b).

Dependent claims

Claims 2-4, 12, 16, and 33, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Lester for at least those reasons discussed above with respect to claim 1.

Rejection of claims 1, 14-15, 18-19, 30-31, and 34-35 under 35 U.S.C. §102(b)

The Office Action states that Thibeault teaches all of Applicants' recited elements.

As discussed above, independent claim 1 has been amended to recite, inter alia, a radiation-emitting semiconductor device that includes a multilayer structure "wherein... the semiconductor device is free of a deposition substrate of the multilayer structure", which Thibeault fails to teach or suggest.

As previously discussed, Applicants' invention is now clearly directed to a complete and whole semiconductor device and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Thibeault discloses an LED 30 utilizing flip-chip mounting. Micro-LEDs 32 are formed in an array by etching away semiconductor material of a full LED structure. Each micro-LED 32 has an active layer surrounded by two oppositely doped layers. Each of the micro-LEDs 32 has angled side surfaces, and a top layer that is narrower than a bottom layer. The micro-LED array is formed on a first spreader layer 34 that is formed on a substrate 36 (i.e., a deposition substrate). An insulating layer 38 covers the micro-LEDs and the surface of the first spreader between adjacent micro-LEDs. On each micro-LED 32, a hole is included in the insulating layer

38 for a top contact 40. A second spreader layer 42 coats the entire micro-LED array to interconnect the top contacts 40 (see Fig. 3, and col. 6, line 53 to col. 7, line 2 of Thibeault).

The Examiner cites Fig. 3 of Thibeault as teaching Applicants' recited invention. Applicants disagree. As described above, and also as clearly shown in Fig. 3 of Thibeault, the multilayer device of Thibeault includes a substrate 36. There is no teaching or suggestion in Thibeault that the substrate 36 could be omitted, or is removed.

In contrast to Thibeault, and as clearly shown in Applicants' Fig. 5, Applicants' multilayer structure 12 is free of a deposition substrate. Therefore, Thibeault clearly fails to teach or suggest a radiation-emitting semiconductor device that includes a multilayer structure "wherein... the semiconductor device is free of a deposition substrate of the multilayer structure", as recited in Applicants' claim 1.

In response to Applicants' previous arguments, the Examiner again continues to assert that the term "semiconductor component" is merely a label and a broad limitation. The Examiner further continues to assert that the n type layer, the emission layer 32, the p type layer, and the reflective layer 48 of Thibeault together can form Applicants' recited multilayer structure without the substrate 36, and thus the multilayer structure of Thibeault is free of a deposition substrate. Applicants disagree with the Examiner's reasoning and interpretation of Thibeault.

As described above, Applicants' claims have been amended to now recite a semiconductor device, which is clearly a complete and whole semiconductor device, and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Therefore, in view of the amendments to Applicants' claims, the Examiner cannot select an arbitrary sub-sequence of single layers of the device of Thibeault as reading on Applicants'

claims. The Examiner must consider the entire device disclosed by Thibeault, which fails to teach or suggest Applicants' recited device, which "is free of a deposition substrate".

Independent 18 recites limitations similar to those of independent claim 1 and is, therefore, deemed to be patentably distinct over Thibeault for at least those reasons discussed above with respect to claim 1.

In view of the foregoing, Applicants submit that Thibeault fails to teach or suggest the subject matter recited in independent claims 1 and 18. Accordingly, claims 1 and 18 are patentable over Thibeault under 35 U.S.C. §102(b).

Dependent claims

Claims 14-15, 19, 30-31, and 34-35, which depend from independent claims 1 and 18, incorporate all of the limitations of the corresponding independent claim and are, therefore, deemed to be patentably distinct over Thibeault for at least those reasons discussed above with respect to claims 1 and 18.

Rejection of claims 18-20 and 37 under 35 U.S.C. §102(b)

The Office Action states that Nishitani teaches all of Applicants' recited elements.

Independent claim 18 has been amended to recite, inter alia, a radiation-emitting semiconductor device that includes a multilayer structure "wherein... the semiconductor device is free of a deposition substrate of the multilayer structure", which Nishitani fails to teach or suggest.

Support for the above claim amendment can be found in paragraphs [0042] and [0047] of Applicants' published specification. Furthermore, according to the "Dictionary of Engineering

and Technology” (see page 352, a copy of which is attached hereto), the term “device” means “bauelement” in German (see WO 2004/017430 A1 p.3, last paragraph).

As amended, Applicants’ invention is now clearly directed to a complete and whole semiconductor device, and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Nishitani discloses a semiconductor light-emitting device (i.e., a semiconductor component). The semiconductor light emitting device includes an n-GaAs substrate 1 (i.e., deposition substrate) on which an n-GaAs buffer layer 2, an n-InAlP/GaAs light reflection layer 3, an n-InGaAlP clad layer 4, an undoped InGaAlP active layer 5, a p-InGaAlP clad layer 6, a p-GaAlAs current diffusion layer 7, and a p-GaAlAs light scattering layer 8 are sequentially deposited. A metal electrode 9 is formed at the center on the top face of the light scattering layer 8, and a metal electrode 10 is formed over the bottom face of the substrate 1. The light reflection layer 3 has a multilayer structure consisting of n-InAlP and n-GaAs layers that are alternately laid one atop another (see col. 3, lines 9-24 of Nishitani).

The Examiner cites Fig. 4 of Nishitani as teaching Applicants’ recited invention. Applicants disagree. As described above, and also as clearly shown in Fig. 4 of Nishitani, the multilayer device of Nishitani includes a substrate 1. There is no teaching or suggestion in Nishitani that the substrate 1 could be omitted, or is removed.

In contrast to Nishitani, and as clearly shown in Applicants’ Fig. 5, Applicants’ multilayer structure 12 is free of a deposition substrate. Therefore, Nishitani clearly fails to teach or suggest a radiation-emitting semiconductor device that includes a multilayer structure “wherein... the semiconductor device is free of a deposition substrate of the multilayer structure”, as recited in Applicants’ claim 1.

In response to Applicants' previous arguments, the Examiner continues to assert that the term "semiconductor component" is merely a label and a broad limitation. The Examiner further continues to assert that the n type layer 4, the emission layer 5, the p type layer 6, and the reflective layer 9 of Nishitani together can form Applicants' recited semiconductor component without the substrate 1, and thus that the multilayer structure of Nishitani is free of a deposition substrate. Applicants disagree with the Examiner's reasoning and interpretation of Nishitani.

As described above, Applicants' claims have been amended to now recite a semiconductor device, which is clearly a complete and whole semiconductor device, and cannot, in any way, be interpreted as being directed to a part or portion of a device.

Therefore, in view of the amendments to Applicants' claims, the Examiner cannot select an arbitrary sub-sequence of single layers of the device of Nishitani as reading on Applicants' claims. The Examiner must consider the entire device disclosed by Nishitani, which fails to teach or suggest Applicants' recited device, which "is free of a deposition substrate".

In view of the foregoing, Applicants submit that Nishitani fails to teach or suggest the subject matter recited in independent claim 18. Accordingly, claim 18 is patentable over Nishitani under 35 U.S.C. §102(b).

Dependent claims

Claims 19-20 and 37, which depend from independent claim 18, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Nishitani for at least those reasons discussed above with respect to claim 18.

Rejection of claims 5-11 and 13 under 35 U.S.C. §103(a)

The Office Action states that Lester teaches all of Applicants' elements recited in claim 1.

As previously discussed, Lester fails to teach or suggest the subject matter recited in Applicants' independent claim 1.

Claims 5-11 and 13, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, deemed to be patentably distinct over Lester for at least those reasons discussed above with respect to independent claim 1.

Rejection of claims 17 under 35 U.S.C. 103(a)

The Office Action states that the combination of Lester and Yamazaki teaches all of Applicants' recited elements.

As previously discussed, Lester fails to teach or suggest the subject matter recited in Applicant's independent claim 1.

Because Lester fails to teach or suggest the subject matter recited in amended claim 1, and because Yamazaki fails to teach or suggest the elements of claim 1 that Lester is missing, the addition of Yamazaki to the Lester reference fails to remedy the above-described deficiencies of Lester.

Claim 17, which depends from independent claim 1, incorporates all of the limitations of independent claim 1 and is, therefore, deemed to be patentably distinct over Lester and Yamazaki for at least those reasons discussed above with respect to independent claim 1.

Rejection of claims 20-29 and 36 under 35 U.S.C. 103(a)

The Office Action states that Thibeault teaches all of Applicants' elements recited in claim 18.

As previously discussed, Thibeault fails to teach or suggest the subject matter recited in Applicants' independent claim 18.

Claims 20-29 and 36, which depend from amended independent claim 18, incorporate all of the limitations of independent claim 18 and are, therefore, deemed to be patentably distinct over Thibeault for at least those reasons discussed above with respect to claim 18.

Rejection of claim 32 under 35 U.S.C. 103(a)

The Office Action states that the combination of Thibeault and Yamazaki teaches all of Applicants' recited elements.

As previously discussed, Thibeault fails to teach or suggest the subject matter recited in Applicant's independent claim 18.

Because Thibeault fails to teach or suggest the subject matter recited in amended claim 18, and because Yamazaki fails to teach or suggest the elements of claim 18 that Thibeault is missing, the addition of Yamazaki to the Thibeault reference fails to remedy the above-described deficiencies of Thibeault.

Claim 32, which depends from independent claim 18, incorporates all of the limitations of independent claim 18 and is, therefore, deemed to be patentably distinct over Thibeault and Yamazaki for at least those reasons discussed above with respect to independent claim 18.

Conclusion

In view of the foregoing, reconsideration and withdrawal of all rejections, and allowance of all pending claims, are respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned to facilitate an early resolution of any outstanding issues.

Respectfully submitted,
COHEN PONTANI LIEBERMAN & PAVANE LLP

By /Edward M. Weisz/
Edward M. Weisz
Reg. No. 37,257
551 Fifth Avenue, Suite 1210
New York, New York 10176
(212) 687-2770

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